

WHAT IS CLAIMED IS:

1. An image pickup element comprising:
  - a plurality of pixels that pick up an object image;
  - 5 a gain variable amplifying circuit that amplifies a signal from the plurality of pixels; and
  - a semiconductor substrate on which the plurality of pixels and the gain variable amplifying circuit are formed,
  - 10 wherein the gain variable amplifying circuit comprises a first amplifying circuit that amplifies the signal from the plurality of pixels and a second amplifying circuit that amplifies a signal from the first amplifying circuit and is connected in series
  - 15 with the first amplifying circuit, and
  - wherein a gain of the first amplifying circuit is switched at every first multiple and a gain of the second amplifying circuit is switched at every second multiple different from the first multiple.
  - 20
2. An image pickup element according to claim 1, further comprising:
  - an input terminal to which a control signal for gain switching of the amplifying circuit is input
  - 25 from an outside of the image pickup element; and
  - converting means for converting a time series signal from the input terminal into a parallel signal,

wherein the amplifying circuit is controlled in accordance with the parallel signal from the converting means.

5           3. An image pickup element according to claim 1, wherein the first amplifying circuit is a voltage-current conversion circuit that converts a voltage into a current and outputs the converted current, and the second amplifying circuit is a current-voltage  
10 conversion circuit that converts the current into a voltage and outputs the converted voltage.

          4. An image pickup device comprising:  
          an image pickup element according to claim 1;  
15           a lens that images light onto the image pickup element;

          an analog-digital conversion circuit that converts a signal from the amplifying circuit into a digital signal; and

20           a signal processing circuit that processes the digital signal from the analog-digital conversion circuit.

          5. A differential amplifying circuit  
25 comprising:

          a first input element to which a first signal is input;

a second input element to which a second signal is input; and

a constant current circuit that drives the first input element and the second input element,

5        wherein the differential amplifying circuit outputs a differential signal between the first signal input to the first input element and the second signal input to the second input element, and

       wherein the first input element and the constant  
10    current circuit are connected with each other through a first resistor element, the second input element and the constant current circuit are connected with each other through a second resistor element, an end of the first resistor element which is located on an  
15    opposite side to the first input element and an end of the second resistor element which is located on an opposite side to the second input element are connected with the constant current circuit.

20        6. A differential amplifying circuit according to claim 5, wherein the first input element comprises a first transistor whose control electrode receives the first signal, the second input element comprises a second transistor whose control electrode receives  
25    the second signal,

       the differential amplifying circuit further comprising:

a first operational amplifier whose output  
portion is connected with the control electrode of  
the first transistor and whose input portion is  
connected with a main electrode of the first  
5 transistor; and

a second operational amplifier whose output  
portion is connected with the control electrode of  
the second transistor and whose input portion is  
connected with a main electrode of the second  
10 transistor

7. An image pickup device comprising:  
an image pickup region that picks up an object  
image; and  
15 a differential amplifying circuit according to  
claim 5 or 6 that amplifies a signal from the image  
pickup region and outputs the signal.

8. An image pickup device according to claim 7,  
20 further comprising a signal processing circuit that  
processes the signal from the differential amplifying  
circuit.